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09/744,614	01/26/2001	John G. Carman	T9212 PCT US	1620

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EXAMINER
MOONAN, FRANCIS P

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Please find below and/or attached an Office communication concerning this application or proceeding.

Application No.	Applicant(s)
09/744,614	CARMAN, JOHN G
Examiner	**Art Unit**
Francis P Moonan	1638

Office Action Summary

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 April 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) *3,4,6,7,10,11,13 and 14* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,8,9 and 12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 January 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a)☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3*.
4)☐ Interview Summary (PTO-413) Paper No(s) _____
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other

DETAILED ACTION

Applicant's election with traverse of Group I, Claims 1-2, 5, 8-9, and 12, in Paper No. 9 filed on 18 April 2002 is acknowledged.

The traversal is on the grounds that the inventions listed as Groups I-VI relate as a single general inventive concept under PCT Rule 13.1, with an assertion that Ellerstrom et al (1983. Hereditas 99:315) do not teach "stabilizing" for an apomictic plant, as defined on page 12, lines 10-13 of the instant specification.

Applicant's traverse is not found persuasive because:

Ellerstrom et al (1983) teach on page 315, column 1, line 1 to column 2, line 9, that apomixis occurs *Raphanobrassica*, as they have previously taught in Ellerstrom et al (1977), and that although diplosporic apomixis could be determined in some *Raphanobrassica* lines, that it was unclear whether aposporic apomixis was stabilized in certain *Raphanobrassica* lines, because histological assays had indicated that aposporic embryo sacs were frequently produced in certain lines. Applicant's assertion that Ellerstrom et al (1983) do not teach the making of a stabilized apomict is based upon the part of the teachings of Ellerstrom et al (1983) which refer to the genetic instability of aposporic apomixis in certain *Raphanobrassica* lines, but does not address the implied teachings of Ellerstrom et al (1983) on page 1, column 1, lines 1-12, regarding diplosporic apomixis in certain *Raphanobrassica* lines, by the citation of the teachings of Ellerstrom et al (1977. Hereditas 87:107-120). Specifically, the teachings that are summarized from Ellerstrom et al (1977), for example teach in the Abstract on page 107; on page 107, column 1, line 1 to column 2, line 20; and on page 109, column 1, lines 6-54, that plant crosses of different *Raphanus* accessions with *Brassica* produced certain interspecific plant lines that were characterized by histological assays, as exhibiting genetically stabilized diplosporic apomixis. Accordingly, a genetically stabilized apomictic plant lacks an inventive step or is not novel in view of Ellerstrom et al (1983) in light of Ellerstrom (1977), or in view of Ellerstrom et al (1977), because the technical feature linking the inventions of Groups I-VI does not define a contribution over the prior art.

Furthermore, applicant fails to traverse any of the reasons for restriction discussed in Paper No. 8, including the discussion of the distinctness of the special technical features of the inventions of Groups I-VI, which were also criteria for the restriction of the Groups I-VI.

The restriction requirement is still deemed proper and is therefore made FINAL.

Claims 3-4, 6-7, 10-11, and 13-14, are withdrawn from consideration as drawn to a nonelected Group.

Claims 1-2, 5, 8-9, and 12, are examined in the Office Action that follows, and each of the claims will be examined to the extent that they read on an Elected Group I.

Abstract Objections

The abstract of the disclosure is objected to because it both exceeds 250 words and exceeds 25 lines in length. See MPEP § 608.01(b).

Appropriate correction is required.

Drawing Objections

The drawings in this application are objected as informal. This application has been filed with informal drawings which are acceptable for examination purposes only.

Applicant is required to submit a proposed drawing correction in reply to this Office action. See the attached PTO-948 form. However, formal correction of the noted defect may be deferred until after the examiner has considered the proposed drawing correction. Failure to timely submit the proposed drawing correction will result in the abandonment of the application.

Formal drawings will be required when the application is allowed.

Claim Objections

Claims 1-2, 5, 8-9, and 12 are objected to because of the following informalities:

Claims 1 and 8 are objected to for the recitation of the phrase "producing through chromosome doubling", as recited in Claim 1, as being drawn to a nonelected Group II.

Claims 2 and 9 are objected to for the recitation of the phrase "greater pollen fertility", as recited in Claim 2, as being drawn to a nonelected Group VI.

Claims 5 and 12 are objected to for the recitation of the phrases "or through genetic engineering procedures using transgenic constructs"; "or transforming"; "except in the optional case of an inducible down regulation of a transgenic promoter/gene construct, which gene construct causes meiotic abortion when expressed, such that facultative apomixis is expressed"; and "except during an inducible up regulation of a transgenic promoter gene construct, that

when expressed causes meiotic abortion resulting in essentially 100% apomictic seed formation", as recited in Claim 5, as being drawn to a nonelected Group V.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 2 and 5, and Clams 8, 9 and 12 respectively dependent thereon are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 2, and 5 are rejected as narrative and indefinite; utilizing vague language; and utilizing terminology that is not art accepted, is not defined in the instant specification, and in general fails to conform with current U.S. practice. Furthermore, the claims are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements and method steps, such omission amounting to a gap between the elements or a gap between method steps. See MPEP § 2172.01.

The essential steps omitted include: (1) an essential step of a characterization of the trait of genetically stabilizing of apomixis, omitted from Claims 2 and 5, and omitted in the narrative form of "genetically stabilizing...exhibiting genetic instability" in Claim 1; (2) an essential step of performing a (2N + N) hybridization to make a B_{III} hybrid, omitted in Claims 1 and 2 by the narrative from of the claims; and (3) an essential method step of comparing the frequency of the expression of the traits of parthenogenesis and unreduced egg formation in progeny, to said frequency of expression of said trait in a nonspecified parental, omitted by the narrative form of "increasing fertility...parthenogenesis" in Claim 2.

The essential elements omitted include: (1) an essential element that the parental plants must be capable of producing progeny which have homeologous pairs of chromatids wherein each chromatid may comprise different allelic forms of a multitude of nonspecified genes whose expression contributes to the expression of a trait of genetically stabilizing of apomixis, omitted

by the narrative forms of claims 1 and 2, for example by the narrative recitation of "from said plant such that duplicate genes....within the polyploid derivative line" in Claim 1; and (2) an essential element that the plant made by the method of Claim 2 is an allopolyploid, and further comprises a trait of a greater unreduced egg fertility or parthenogenic form of reproduction, omitted by the narrative form of "increasing fertility...parthenogenesis" recited in the claim.

New matter should be avoided .

Claim 1 is rejected as vague and indefinite in the recitation of "fortuitous recombinations". The term "fortuitous" is a relative and vague one, without a specific contextual meaning". The phrase "fortuitous recombination" renders the claim indefinite because the claim includes elements not actually disclosed (those encompassed by whatever is considered relatively "fortuitous"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d). Applicant is advised that deletion of "fortuitous" in the claim would obviate this rejection.

Claim 1 is rejected as vague and confusing in the recitation of "duplicate genes... isolated from each other on opposite homeologous genomes". The phrase "opposite homeologous genomes" is vague and confusing as to whether the phrase is drawn to different genomes of different plants, or to homeologous chromatids of the genome of a single plant. Furthermore, the recitation of the term "isolation" is vague and confusing as to whether this term is drawn to physical location; or to some form of genetic isolation, such as duplication as a pseudogene or mutant gene of nonspecified sequence substitution, insertion, or deletion.

Claims 1 and 2 are rejected as vague and indefinite in the recitation of "B_{III} hybridization". While applicant may be his or her own lexicographer, a term in a claim may not be given a meaning repugnant to the usual meaning of that term. See *In re Hill*, 161 F.2d 367, 73 USPQ 482 (CCPA 1947). The term is undefined in both the instant specification, and its meaning is not discernable from the context of its use in the claims, and fails to set forth the metes and bounds of the invention. A "B_{III} hybrid" is an art accepted term for a hybrid plant produced as a result of the combining of an unreduced egg (2N) with unreduced sperm nuclei (1N), by what is known by those of skill in the art as a "(2N +N) hybridization". However, it is unclear whether "B_{III} hybridization" may be intended in the claims to only include an art-accepted "(2N + N) hybridization" type of hybridization, which is used to make a "B_{III} hybrid";

or whether the term is intended to be interpreted to include some nonspecified, nondisclosed, and nonrecited hybridization procedure that in some form uses a "B_{III} hybrid", or some other process with plants of a microevolutionarily defined "stage III" population structure, as for example in Figure 1 of the instant specification.

Claim 2 is rejected as vague and indefinite in the recitation of the phrase "similar plant". The phrase fails to set forth the metes and bounds of the invention, because, for example, all angiosperms and gymnosperms are similar plants in that they produce flowers.

Claim 2 is rejected as vague and indefinite in the recitation of the phrase "segmental allopolyploidy". It is unclear as to what is intended by the recitation of a "segmental" form of allopolyploidy. This term is neither art-accepted as a descriptor of forms of allopolyploidy, nor is defined in either the instant specification or the claims, and therefore fails to set forth the metes and bounds of the invention. See MPEP 2173.03 and 2173.05(a).

Claim 5 is rejected as vague and indefinite in the recitation of "genetically enhancing". The phrase has no specific meaning drawn to any particular type of plant improvement, and fails to set forth the metes and bounds of the invention.

Claim 5 is rejected as vague and indefinite in the recitation of "genetically stabilizing it" on line 4 of the claim. The phrase is not art accepted, nor may be interpreted as any particular process or process step in its narrative form, and fails to set forth the metes and bounds of the invention.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-2, 5, 8-9, and 12 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 1 is broadly drawn to a method for making a polyploid plant with the characteristics of comprising two genomes whose chromatid pairs may be considered homeologous; alleles whose differential expression from said homeologous chromosomes confer a trait of genetically stabilizing apomixis; and comprising the steps of : performing a (2N + N) hybridization; and characterizing progeny plants for a trait of genetically stabilized apomixis, by comparing the relative ratio of sexual versus asexual reproduction in a plant to the ratio expressed in one of its parental plants. "B_{III} hybridization" is interpreted to include a step of performing a (2N + N) hybridization to make a B_{III} hybrid . Claim 2 is further limited that the plant has an allopolyploid genome, and that the plant comprises a trait of either an increased development of embryo sacs derived from unreduced eggs, in the production of an increased number of apomictic and viable embryos or seed, or a trait of increased apomictic embryo or seed by parthenogenic developmental mechanisms. Claim 5 is broadly drawn to a method for breeding a plant for both an unspecified but agronomically desired trait, as well as a trait of essentially 100% apomictic seed production. Claims 8, 9, and 12 are broadly drawn to plants made respectively by the methods of Claims 1, 2, and 5.

Ellerstrom et al (1977. Heriditas 87:107-120) and Hovin et al (1976. Crop Sci. 16 :635-638) teach that it is unpredictable whether attempts to correlate plant genotypic or phenotypic characteristics with a trait of genetically stabilized apomixis, when plants are grown under any particular environmental condition, may result in the production of plants genetically stabilized for apomixis under a different environmental growth condition. Ellerstrom et al (1977) teach for example in the Abstract on page 107; on page 107, column 2, lines 1-18; in Tables 1-3 on pages 108 and 113; and on page 108, column 1, line 12 to page 118, column 2, line 39 that genetic enhancement of the trait of female fertility using the genetically stabilized diplosporic apomictic *Raphanobrassica* lines was attempted by developing new *Raphanobrassica*-derived plant lines which had increased seed set of apomictic seed, by performing additional crossing or breeding steps, but that rather than breeding for a trait of genetically stabilizing diplosporic apomixis in new progeny, that female fertility decreased, and genetic instability of apomixis also increased. Ellerstrom et al (1977) teach for example in Tables 1-3 on pages 108 and 113; on page 108, column 2, lines 1-15; and on page 114, column 1, line 5 to page 118, column 2, line 45, that some type of environmental influence, due to the climactic variation over the 1973-1975 period,

led to wide variations in apomictic phenotypic expression in the progeny that were analyzed, and prevented the successful production of progeny exhibiting both genetic enhancement of fertility and genetically stabilized apomixis. Hovin et al teach for example in Table 1; and on page 636, column 2, lines 27-34, that in a 1967 planting, a KB6 clone Fyling cultivar from Sweden, and a KB7 clone PI274646 accession from Sweden failed to flower because the Alabama and Kentucky sites at which they were grown failed to initiate flower formation because they lacked the low enough temperatures that were required for flower vernalization for these genotypes. Furthermore, Hovin et al teach for example in the Abstract on page 635; and Tables 2 and 3 on page 637, that under the same condition of photoperiod, that apomictic seed set for Kentucky Bluegrass clones varied significantly, when grown in different years at the same location, or at different locations in the same year, under the same photoperiod. Hovin et al teach for example in Table 2 on page 637 that New Hampshire and Vermont locations in which Kentucky bluegrass was grown had the same photoperiod of 15.5 hours of daylength, but differed in average daily temperatures. Hovin et al teach for example in Tables 2 and 3 on page 637, that when these New Hampshire and Vermont produced seed were grown at Beltsville, MD, which had a photoperiod of 14.5 hours and a different average daily temperature, that 8.5% (21/243) of the plants of the New Hampshire produced seed were deathly weak or aberrant; and that 5.6% (4/72) of the plants of the Vermont produced seed were deathly weak or aberrant . Hovin et al teach for example in Tables 2 and 3 on page 637, that when these New Hampshire and Vermont produced seed were grown at Rock Springs, PA (which had a photoperiod between 14.5 and 15.5 hours), for two successive seasons, that 8.5% (27/320) and 4.5% (14/320) of the plants grown from New Hampshire selected seed were deathly weak or aberrant; and that 2.1% (5/238) and 1.7% (8/238) of the plants grown from Vermont selected seed were deathly weak or aberrant. Hovin et al teach for example in Table 1 on page and Table 4 on page 638, that two Kentucky Bluegrass cultivars of Maryland origin, KB2 and KB2, grown and selected for in Maryland; exhibited 0.9 % versus 10.8% aberrant and weak plants.

Pumhauser et al (1993. Cereal Res. Comm. 21 (2-3):175-179), Bates et al (1974. Proceedings of World-wide maize improvement in the 70's and the role of CIMMT, April 22-26 El Batan, Mexico. 7 pp. CIMMT) and Garcia et al (2000. Maize Genet. Coop. Newsletter 74:40-41) teach that barriers to hybridization for similar plants are unpredictable, and that genotype-

specific methods are required to overcome barriers to sexual hybridization. Purnhauser et al teach for example in the Abstract on page 175; and on page 175, lines 1-14, that because non-synchronously flowering plants grown under the same photoperiod may have differing genotypes whose differentiated responses to photoperiod result in different flowering dates, some means of environmental manipulation in addition to photoperiod must be required in order to successfully cross said plants in a breeding process. Purnhauser et al teach for example on page 175, line 8 to page 176, line 7; and page 176, line 11 to page 177, line 46, that no one particular treatment may suffice to accomplish said environmental manipulation to synchronize flowering dates, and that specific regimes are required to be identified, evaluated, and developed , in relation to each genotypic combination utilized for a desired breeding process. Bates et al teach for example on page 5-1B, line 1 to page 5-2B, line 5, that *Tripsacum* and *Zea* are related groups of species, but that sexual barriers to wide hybridizations between *Zea* spp. and *Tripsacum* spp are genotype specific, and include barriers such as hybrid necrosis and pollen cross-incompatibility. Garcia et al teach for example on page 41 that *Tripsacum* species exhibit a diplosporic gametophyte-altering form of apomixis, similar to the type of apomixis exhibited by *Antennaria* species. Garcia et al teach for example on page 41, that crossing of *Zea mays* inbred line 407B with an accession of *Tripsacum dactyloides* produced hybrid embryos which required embryo rescue *in vitro* on defined tissue culture media, specifically developed for the process of embryo rescue of maize, to prevent the death of the interspecific embryo, by hybrid necrosis on the maternal plant .

De Wet et al (1970. Caryologia 23 :183-87), Garcia et al, and de Wet et al teach that breeding for the trait of genetically stabilizing apomixis is unpredictable. De Wet teach for example in the Abstract on page 183; in Table 1 on page 184; and on page 184, line 1 to page 186, line 17, that when a *Zea mays* cultivar is crossed with a *T. dactyloides* accession of 2N=72 chromosomes, that F1 hybrid progeny seed may be produced, but that the F1 hybrid progeny are: all male sterile; all have 2N=46 chromosomes; and are all female fertile and reproduce by sexual reproduction in crosses with *Zea mays*, as determined by the expression of a kernel color gene transferred from a *Zea mays* tester line comprising said kernel color gene. De Wet et al teach for example in Table 1 on page 184; and on page 184, line 1 to page 186, line 17, that BC1 progeny were genetically unstable in successive backcrosses with *Zea mays* to make BC2 and BC2 plant generations, producing progeny plants in the BC2 and BC3 generation with 2N=56, 54, or 50

chromosome genotypes from a 2N=46 chromosome genotype. De Wet et al teach for example in Table 1 on page 184; and on page 184, line 1 to page 186, line 17, that whenever any of the generated 2N=56 chromosome genotype maternal parents were backcrossed, the progeny were always, of a 2N=38 chromosome genotype, indicating that the maternal 2N=56 chromosome tripsacum-maize interspecific hybrids developed normal megasporogenesis and reproduced sexually, rather than apomictically. De Wet et al teach for example in Table 1 on page 184; and on page 184, line 1 to page 186, line 17, that when 2N=46 chromosome maternal parents were successively backcrossed, by the BC3 generation, 80.25% (65/81) of backcross-generated plants still had a 2N=46 chromosome genotype, while 2/81 or 2.5% (2/81) and 5% (4/81) respectively had a 2N=50 or 2N=54 chromosome genotype, and 14.75% (12/81) of plants had a 2N=56 chromosome genotype.

Furthermore, Garcia et al and de Wet et al teach that the applicability of chromosome counting and karyotype analysis techniques for the screening, identification, and selection of plants in a breeding method, is unpredictable. Garcia et al and de Wet et al each teach the making of maize/tripsacum intergeneric hybrids with *Zea mays* and *Tripsacum dactyloides* to make 2N=56 karyotyped maternal parents, and together teach that karyotyping is unpredictable for the screening, identification, selection, and obtaining of apomictic plants. Garcia et al teach for example on pages 40-41, that the diploid *Zea mays*, including 407B, has 2N=40 chromosomes; the *T. dactyloides* accession used for crossing has 2N=72 chromosomes; *Zea perennis* has 2N=40 chromosomes, and that *Zea diploperennis* has 2N=20 chromosomes. Garcia et al teach that an interspecific hybrid embryo, designated as ZT56 was recovered by the embryo rescue technique, and developed into a plant. Garcia et al teach on page 41 that the ZT56 plants appeared to be male and female infertile, and failed to produce pollen. Garcia et al teach, that although ZT56 appeared to be both female and male infertile, that hybridization with fertile pollen from the related groups of species of *Zea mays*, *Zea perennis*, and *Zea diploperennis*, each resulted in the production of progeny seed, but that the progeny all shared the same maternal 2N=56 chromosome counts of the maternal ZT56 plant, as well as the same molecular marker profile of isozyme gene expression as ZT56, and that ZT 56 was an apomictic plant which required some form of stimulation by pollination, in order to stimulate apomictic reproduction. De Wet et al teach for example in Table 1 on page 184; and on page 184, line 1 to page 186,

line 17, the making of maize tripsaca interspecific crossing to make 2N=56 chromosome karyotyped maternal parents, which reproduced sexually rather than apomictically , as discussed above. Furthermore, de Wet et al teach for example in the Abstract on page 183; in Table 1 on page 184; and on page 184, line 1 to page 186, line 17, that if a B or P1 kernel color marker allele comprising *Zea mays* tester line is used to cross the 2N=46 F1 hybrid, that the B or P1 gene is transferred into an F1 hybrid to produce F2 seeds expressing the colored B or P1 phenotype, and that even though the 46 chromosome genotype is maintained in the progeny of successive crosses, that the apparent identical karyotyped assessment was unreliable for the determination of apomictic versus sexual reproduction.

Hovin et al teach that the characterization or apolosporic or diplosporic development of embryo sacs by the use of histological methods is unpredictable for a determination a trait of genetically stabilizing apomixis. Hovin et al teach for example on page 638, column 2, lines 16-26, that in Kentucky Bluegrass, aposporous apomicts may only be identified very early in floral initiation, at the beginning of megasporogenesis, by the histological staining of densely staining cytoplasm in aposporous cells of the nucellus. Hovin et al teach for example on page 638, column 2, lines 16-26, and that enlargement of embryo sacs occur rapidly, in the same general location as the sexually-derived embryo sacs, and since the sexual and apomictically derived embryo sacs exhibited no distinguishing properties, that apomixis could not be assayed or determined after the early stages of megasporogenesis in Kentucky Bluegrass. Furthermore, Hovin et al teach that in Kentucky Bluegrass clones, as high as 2% of the megaspores from any one clone appeared to lack evidence of nucellar staining activity in histological staining assays, indicating that up to 2% of the seeds appeared to be sexually derived, which may inhibit the ability of one to identify and select an apomictic plant.

De Wet et al teach that the applicability of a screening step for the selection of apomictic plants, on the basis of distinct maternal morphological types among the progeny of a cross, is unpredictable. De Wet et al teach for example in Table 1 on page 184; and on page 184, line 1 to page 186, line 18, that backcrossing with a *Zea mays* pollen donor, to make a BC1 generation from the F1 interspecific hybrid, resulted in the production primarily of the BC1 progeny having a 2N=46 chromosome genotype, and tripsacoid morphology and plant habit, indistinguishable from the F1 hybrid. De Wet et al teach for example, in Table 1 on page 184; and on page 184,

line 1 to page 186, line 18, that progressive BC2 and BC3 generations were also similarly produced by backcrossing with a *Zea mays* line that lacked a kernel color B or P1 marker allele, or comprised said marker alleles. De Wet et al teach for example on page 184, line 1 to page 186, line 17, that a tripsacoid morphology and growth habit identical to the maternal parent, and a 2N=46 chromosome karyotype identical to the maternal parent, occurred in said BC2 and BC3 generation progeny. De Wet et al teach for example on page 184, line 1 to page 186, line 17, that although this phenotype could have been interpreted as indicating reproduction by apomixis, that crossing of the BC2 and BC3 with the *Zea mays* tester lines comprising a B or P1 dominant marker allele for a kernel color trait, resulted in expression of both the kernel color trait and the same tripsacoid growth habit and morphology in the progeny of said cross.

Ellerstrom et al (1977. Heriditas 87:107-120), Ellerstrom et al (1983. Hereditas 99:315), Hanna et al (1987. Crop Sci. 27 :1136-1139), Holm et al (1996. Hereditas 125:77-82), de Wet et al, and Garcia et al teach that in the absence of reliable histological, chromosome counting, and karyotyping technique screening assays for the determination of the trait of genetic stabilizing of apomixis; and in the absence of molecular, genetic, physiological, or morphological markers specifically developed for a particular combination of plant genotypes; that the screening, identification, and selection of plants exhibiting the trait of genetically stabilized apomixis is unpredictable. Ellerstrom et al (1977) teach for example in the Abstract on page 107;on page 107, column 1, line1 to column 2, line 20; and on page 109, column 1, lines 6-54, the (2N · N) hybridization by crossing of a variety different *Raphanus* autotetraploid accessions with diploid *Brassica oleracea* var. *acephala* L., to make allopolyploid *Raphanobrassica* plant lines. Ellerstrom et al (1977) teach for example in the Abstract on page 107;on page 107, column 1, line1 to column 2, line 20; and on page 109, column 1, lines 6-54, that by utilizing histological assays of the various *Raphanobrassica* lines, with analysis done at different stages of female gametophyte development, that aposporic parthenogenesis (apomixis) could be identified in certain *Raphanobrassica* lines, and that diplosporic apomixis resulted from development of unreduced embryo sacs in these lines. Ellerstrom et al (1977) teach for example in the Abstract on page 107; on page 107, column 1, line 1 to column 2, line 20; and on page 109, column 1, lines 6-54, that depending upon the particular combining ability of the specific plant genotypes crossed to produce a particular *Raphanobrassica* plant, the plants appeared to exhibit a trait of

either aposporic or diplosporic form of apomixis, as determined from histological assays, but that only the plants exhibiting diplosporic apomixis exhibited a trait of genetically stabilizing apomixis, while the aposporic forms identified by the assays appeared to exhibit the trait of genetic instability of apomixis, because the aposporic embryos failed to develop into seeds. Ellerstrom et al (1977) further teach in the Abstract on page 107; on page 107, column 2, lines 1-18; in Tables 1-3 on pages 108 and 113; and on page 108, column 1, line 12 to page 118, column 2, line 39 that genetic enhancement of the trait of female fertility using the genetically stabilized diplosporic apomictic *Raphanobrassica* lines was attempted by developing new *Raphanobrassica*-derived plant lines which had increased seed set of apomictic seed, and by performing additional crossing or breeding steps, but that rather than breeding for a trait of genetically stabilizing diplosporic apomixis in new progeny, that female fertility decreased, and genetic instability of apomixis also increased.

Furthermore, Hanna et al (1987) teach on page 1138, column 1, lines 39-47, that given the genotype-specific genetic linkage relationships between genes contributing to a trait of apomixis, genotype specifically-developed genetic or molecular markers may be required in order to effectively screen and breed for apomictic traits. For example, Ellerstrom et al (1977) et al teach that because histological assays which indicated aposporic development were not a predictive assay for progeny seed production, wherein said seed would produce plants with the trait of genetically stabilized apomixis, that testcrosses using genetic marker alleles comprising a *Brassica*-developed dominant yellow flower color allele were required to be used with the white flowered Raphanobrassica lines, to determine the frequency of aposporic apomixis in progeny produced from testcrosses, and thus the determination of the trait of genetic stability of aposporic apomixis. De Wet et al teach on page 186 and Garcia et al teach on page 41, that morphological, physiological, and molecular markers specific for use with analysis of maize/tripsaca hybrids were required to distinguish sexual versus apomictic reproduction in maize/tripsaca interspecific hybrids; and Holm et al teach in Table 1 on page 78; and on page 77, column 1, line 8 to column 2, line 13, that the apomictic form of reproduction in *Potentilla argentea* is so similar to the sexually reproductive form in its biology, that any single plant of the species could not predictably be identified as to its reproductive form, until molecular markers were specifically developed to differentiate the apomictic and sexual reproductive forms in

specific genotypes of *P. argentea*, utilizing four molecular markers that were specifically developed to identify maternal and paternal genotypes.

Kraft et al (2000. Theor. Appl. Genet. 101:323-326), Eshed et al (1996. Genetics 143:1807-1817), Carman et al (1997. Biol. J. Linn. Soc. 61:51-94), Bashaw et al (1987. Chapter 3: Apomictic grasses. Pp. 40-82, In: Principles of Cultivar Development, Vol. 2: Crop Species. MacMillan Publishing Co., NY), and Hanna et al (1987) teach, that in any breeding process, including those that make apomictic plants, that when the plant genotypes comprise polygenic or quantitative trait loci encoding genes whose expression are required to confer a trait, including that of apomixis, that complex environmental and genetic interactions are unpredictable, and that said breeding processes result in unpredictable types of genotypes and phenotypes in progeny plants produced in said process. Kraft et al, and Eshed et al teach that linkage disequilibrium effects, linkage drag, and epistatic effects unpredictably prevent the making of plants comprising a polygenic or QTL encoded trait, and that such effects are unpredictably genotype specific and loci-dependent in nature. Kraft et al teach for example on page 323, column 1, line 7 to line 15 the concept known by those of skill in the art that linkage disequilibrium is created in breeding materials when several lines become fixed for a given set of alleles at a number of different loci, and that very little is typically known about the plant breeding materials, and therefore it is an unpredictable effect in plant breeding. Eshed et al teach for example on page 1815, column 1, line 1 to page 1816, column 1, line 1, that epistatic genetic interactions from the various genetic components comprising contributions from different genomes may affect quantitative traits in a genetically complex and less than additive fashion, so that the making of a progeny with a quantitative trait by sexual hybridization may not be predictably produced from parentals comprising said quantitative traits. Hanna et al, Bashaw et al, and Carman et al teach that the polygenic nature of apomictic trait expression, including the influence of environmental factors on the penetrance of apomictic expression, is unpredictable. Hanna et al teach for example on page 1137, lines 42-46 that the number of genes and genetic modifiers involved are largely unknown and make prediction of success for a breeding process for apomixis uncertain. Carman et al teach that for example on page 56, line 45-51; and on page 62, lines 18-45, that a "genetic completeness" (See page 56) from the result of multiple gene expression appears to be the genetic basis for the phenotypic expression of most forms of

apomixis, and that although regulatory genes controlling duplicate developmental pathways may mimic simple inheritance, a reliance on this interpretation in a breeding process for apomicts generally produces inconsistent or unsuccessful results, because the actual genetic factors are actually much more complex (See page 62). For example, Bashaw et al teach that either the effect of polygenic inheritance, genotype- specific epistatic interactions, or incomplete penetrance of one or more alleles, may be required to confer apomixis in plants. Bashaw et al teach for example on page 47, lines 9-16, that during intraspecific breeding for weeping lovegrass, in which highly sexual plants were crosses with highly apomictic plants as male parents, that the F1 hybrid progeny could be grouped into phenotypic classes of progeny exhibiting either only sexual reproduction, only apomictic reproduction, or an unstable intermediate expression of apomictic and sexual reproduction.

Applicants fail to provide any specific guidance as to how to overcome the barriers to hybridization for the totality of all of the plant species broadly claimed.

Applicants fail to provide any guidance for any specific germplasm parental starting source, in the form of any specific genotype of any accession or cultivar with the recited characteristics, as broadly claimed. The instant specification is replete with listings of a multitude of species of plants which could theoretically be used, but lacks any single form of guidance as to specifically how particular genotypes of these species, or even how any one of the broadly claimed species, would be utilized for : any particular genotypic evaluation, characterization, or selection in a breeding process, required for both "obtaining" plant starting materials with the plant characteristics as broadly recited; or the screening, characterization, evaluation, and selection of hybrids with the phenotypic characteristics as broadly recited.

Applicant fails to provide guidance for how to overcome the effect of environmental factors in altering a determination of facultative apomixis rates, and genetically stabilized apomixis, for any specific genotype, accession, or cultivar, or which would encompass the totality of all of the starting plants required for the making and using of the broadly claimed invention. Applicant fails to provide guidance for how to make and use the method with plants whose facultative expression of apomixis requires the interaction of particular environmental factors for the totality of plants as broadly claimed. For example, apomictic expression is known by those of skill in the art to be affected by photoperiod treatment in a some species of

facultative apomictic plants; that even within species photoperiod responses may vary; and applicant fails to disclose any essential guidance for any specific plant genotype grown under any specific photoperiod, or any other environmental condition, which would affect the interpretation of the expression of facultative apomixis in any particular plant genotype.

Applicant fails to provide guidance as to how to overcome epistatic and polygenic effects to make and use the invention as broadly claimed.

Applicant fails to provide guidance for the screening, evaluation, and selection of the trait of genetically stabilized apomixis for the totality of plants as broadly claimed. For example, applicant fails to provide guidance for the identification, evaluation, and selection of apomictic plants from mixed populations with sexually reproducing plants, when histological and karyotyping screening methods are incapable of distinguishing the two forms of reproduction. Furthermore, applicant fails to disclose any specific plant genotype with any specific plant phenotypic or genotypic marker, required to make and use the broadly claimed invention.

Given the claim breadth, the unpredictability, and lack of guidance as discussed above, undue experimentation would have been required by one of skill in the art to: identify, evaluate, and develop a multitude of photoperiod regimes specific for the combination of broadly claimed plant genotypes having the broadly claimed characteristics; identify, characterize, evaluate, and obtain a multitude of plants to be utilized as starting material; identify, evaluate, and develop a multitude of techniques which would be required for one to overcome barriers to hybridization; identify, characterize, evaluate, and develop a multitude of selection steps which could be used when histological and karyotyping characterization and selection methods cannot be used for identification and selection of an apomictic plant from a mixed population of sexually reproducing and apomictic progeny plants; identify, characterize, evaluate, and develop a multitude of genotypic-specific genetic, molecular, morphological, physiological, or molecular markers; and perform an unspecified multitude of crosses with an unspecified multitude of plants comprising an unspecified multitude of plant genotypes, to make and /or use the claimed invention.

Claim Rejections - 35 USC § 102, 102/103, and 103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-2, 5, 8-9 and 12 are rejected under 35 U.S.C. 102(e) as anticipated by Hanna et al (US Patent No. 5,811,636 filed on 22 September 1995).

Claim 1 is broadly drawn to a method for making a polyploid plant by sexual hybridization with the characteristics of: plants made comprise two genomes whose chromatid pairs may be considered homeologous; plants made comprise alleles whose differential expression from said homeologous chromosomes confers a trait of genetically stabilizing apomixis; the plants made are made with at least one step that uses a "B_{III} hybridization". A "B_{III} hybridization" is interpreted to include a (2N + N) hybridization that is used to make a B_{III} hybrid. Claim 2 is further limited that the plant made has an allopolyploid genome, and that the plant comprises a trait of either an increased development of embryo sacs derived from unreduced eggs, in the production of an increased number of apomictic and viable embryos or seed, or a trait of increased apomictic embryo or seed by parthenogenic developmental mechanisms. Claim 5 is broadly drawn to a method for breeding a plant for both an unspecified but agronomically desired trait, as well as a trait of essentially 100% apomictic seed production. Claims 8, 9, and 12 are broadly drawn to plants made respectively by the methods of Claims 1, 2, and 5.

Hanna et al (US Patent No. 5,811,636) teach for example Table 1 in Column 9; and in column 4, line 45, to column 5, line 33, the making of a "Doublecross-trispecific" line of

netically stabilized aposporic apomixis, derived from a (2N + N) *nnisetum glaucum* hybrid and a diploid *P. squamulatum* hybrid, parental *Pennisetum* lines is required to genotype-specifically rility barrier that occurs in the progeny when inbred lines are ng process.

No. 5,811,636) teach for example in column 9, line11 to column ssayed for the trait of genetically stabilized aposporic apomixis phenotypes in progeny as assayed by histological analyses; logical markers of pearl millet morphology which differed from *tum* or the "Doublecross-trispecific" plant.

No. 5,811,636) teach for example Table 1 in Column 9, that the bridging line hybrid parent of the "Doublecross-trispecific" line d line of cultivated pearl millet with an inbred line of

No. 5,811,636) teach for example Table 1 in Column 9; Table 2 in 8 to column 10, line 43; and in Claims 1-11, the making of a he of *Pennisetum* with the trait of genetically stabilized aposporic -N) hybridization of a tetraploid *Pennisetum glaucum* and a current backcrossing with the tetraploid cultivated inbred line of

rejected under 35 U.S.C. 102(b) as anticipated by Ellerstrom et al

teach for example in the Abstract on page 107; on page 107, ne 20; and on page 109, column 1, lines 6-54, the (2N - N) ariety different *Raphanus* autotetraploid accessions with diploid *a* L., to make allopolyploid *Raphanobrassica* plant lines.

teach for example in the Abstract on page 107; on page 107, ne 20; and on page 109, column 1, lines 6-54, that depending bility of the specific plant genotypes crossed to produce a

particular *Raphanobrassica* plant, the plants exhibited a trait of either aposporic or diplosporic forms of stabilized apomixis.

Ellerstrom et al (1977) teach for example in the Abstract on page 107; on page 107, column 1, line 1 to column 2, line 20; and on page 109, column 1, lines 6-54, that by utilizing histological assays of the various *Raphanobrassica* lines, with analysis done at different stages of female gametophyte development, that aposporic parthenogenesis (apomixis) could be identified in certain *Raphanobrassica* lines, and that diplosporic apomixis resulting from development of unreduced embryo sacs.

Ellerstrom et al (1977) teach for example in the Abstract on page 107; on page 107, column 1, line 1 to column 2, line 20; and on page 109, column 1, lines 6-54, the making of essentially 100% apomictic seed producing diplosporic apomictic *Raphanobrassica* which exhibit increased unreduced egg fertility.

Claims 5 and 12 are rejected under 35 U.S.C. 102(b) as anticipated by Saran et al (1976. J. Cytol. Genet. 11:22-28).

Saran et al teach for example on page 1, lines 1-5, that the expression of a trait of apomictic reproduction in facultative apomictic plants is controlled by the environmental conditions under which they are grown, and that the genus *Dichanthium* comprises a number of facultatively apomictic grass species.

Saran et al teach for example in the Abstract on page 22; on page 22, lines 1-12, and lines 19-21, that the manipulation of the environmental condition of photoperiod may affect the expression of facultative apomixis not only in *Dichanthium* species.

Saran et al teach for example on page 22, line 25-27 the obtaining of two wild biotype accessions of *D intermedium* at the same longitude and latitude, which exhibited varying degrees of apomictic expression in the field, wherein one accession exhibited the production of primarily apomictically produced progeny seed, and another exhibited the production of primarily sexually produced seed.

Saran et al teach for example on page 23, lines 3-5, and lines 29-40, that acetocarmine squash assays and paraffin-embedding, sectioning, and histological analysis assays were utilized to identify and characterize the nature of the apomictic development of these biotypes, and that

early stages of megagametophyte development was identical in the lines, and it was not possible to classify sexual or apomictic embryo sacs, but that the development of supernumery embryo sacs in an ovule at later stages of development indicated the expression of an aposporic apomictic trait; and that in the sexual lines , only one sexual embryo sac developed in each ovule.

Saran et al teach for example on page 22, line 24 to page 23, line 26, the crossing of the two sexually reproducing biotypes of *D. intermedium*, which exhibited varying degrees of apomictic expression when grown with the same seasonal photoperiod, to produce a selected F1 tetraploid hybrid plant designated as X570.

Saran et al teach for example on page 22, line 24 to page 23, line 26, that X570 was vegetatively propagated by cuttings, and whose apomictic expression was assayed by cytological and histological methods when grown under different photoperiod regimes in growth chambers, set at approximately 22 degrees centigrade.

Saran et al teach that X570 exhibited the trait of genetically stabilized apomixis. Saran et al teach for example in Table 1 and Figure 1 on page 23, line 3 to page 27, line 44, that a 12 hour daylength photoperiod treatment of X750 resulted in 63.4% of the embryo sacs expressing the trait of apomictic reproduction, while a 24 hour daylength photoperiod treatment under the same regime of temperature and humidity resulted in 21.6 % of the embryo sacs of X750 expressing the trait of apomictic reproduction.

Saran et al teach that expression of the trait of genetically stabilized apomixis in Dichanthium requires growth of plants under at least environmental conditions of a 12 hour photoperiod. Saran et al teach for example in Table 2, that although the 14 hour photoperiod treatment of X750 resulted in the expression of aposporic embryo sacs in 21.6 % of its embryo sacs, very few of these aposporic embryos developed to completion, and subsequently produced seed progeny, whereas the 12 hour photoperiod treatment appeared to allow a substantive seed set of apomictic seed progeny.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 8-9 and 12 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kindiger et al (US Patent No. 5,710,367).

Kindiger et al teach for example in Figure 1 and in Claims 1-28, the making of a ATCC Accession No. 97233 line of maize with the trait of genetically stabilized diplosporic apomixis, derived from a (2N + N) hybridization of a tetraploid *Tripsacum dactyloides* and a diploid *Zea mays*.

The ATCC Accession No. 97233 plants taught by Kindiger et al differ from the claimed plants only in their obtention by particular crosses. However, the use of a different process utilizing a different number of plant crosses would not confer a unique characteristic to the claimed genetically stabilized apomictic plants which would distinguish them from the prior art plants. See *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985), which teaches that a product-by process claim may be properly rejected over prior art teaching the same product produced by a different process, if the process of making the product fails to distinguish the products.

Claims 1-2, 5, 8-9 and 12 are rejected under 35 U.S.C. 103(a) as obvious over Ellerstrom et al (1977) in view of Ellerstrom et al (1983. Hereditas 99:315).

Ellerstrom et al (1977) teach the making of apomictic *Raphanobrassica* as discussed in the 35 U.S.C. 102(b) rejection above.

Ellerstrom et al (1977) teach for example on page 107, column 2, lines 1-18 that genetic enhancement of the trait of female fertility using these *Raphanobrassica* lines might be done by developing new *Raphanobrassica*-derived plant lines which had increased seed set of apomictic seed, by performing additional crossing or breeding steps.

Ellerstrom et al (1977) teach for example in the Abstract on page 107; on page 107, column 1, line 1 to column 2, line 20; and on page 109, column 1, line 6 to page 114, column 2, line 45, that although aposporic apomictic *Raphanobrassica* exhibited increased parthenogenesis, as determined by histological assays which identified aposporic embryo sacs,

the histological assays for apospory were unreliable in predicting the production of genetically stabilized aposporic apomictic seed, in comparison to the predominantly sexually reproducing *Brassica* and *Raphanus* plant parentals used to make the *Raphanobrassica* lines.

Ellerstrom et al (1977) suggest on page 118, column 1, line 1 to column 2, line 12, that the use of genetic markers might allow a reliable determination, including morphological markers drawn to matromorphic traits, or genetic markers which could be transmitted from a pollen source.

Ellerstrom (1977) suggest on page 107, column 2, lines 1-18; and page 117, column 1, line 30, to column 2, line 56, that this stabilized apomixis in *Raphanobrassica* was most likely due to the establishment of asynchronous gene expression in progeny plants in response to some undetermined environmental factor, and that consistency in environmental growth conditions should be evaluated in addition to phenotype expression, in the development of an apomictic breeding processes for any plant.

Ellerstrom et al (1977) do not teach any specific successful genetic enhancement of a genetically stabilized apomictic plant, wherein the progeny plants exhibit both agronomic enhancement and the retention of the trait of genetically stabilized diplosporic apomixis; or the use of any genetic, morphological, or physiological, or molecular markers for the reliable assessment of a genetically stabilized aposporic apomictic trait.

Ellerstrom et al (1983) teach for example on page 315, column 1, line 1 to column 2, line 9, the use of a genetic marker allele for flower color, developed in a *Brassica* plant, that could successfully be used to evaluate progeny and the trait of genetic stabilized aposporic apomixis in *Raphanobrassica*-derived progeny.

It would have been obvious to one of ordinary skill in the art to use the plant materials and methods taught by Ellerstrom et al (1997) and Ellerstrom et al (1983), and to combine them under controlled and evaluated environmental conditions, to make the plants with the trait of genetically stabilized apomixis, and derivatives of these plants with improved agronomic qualities such as increased seed set, and evaluating apomixis with genetic markers, as suggested by Ellerstrom et al (1977). The use of recurrent hybridization and selection would have been an obvious design choice for one of ordinary skill in the art.

Claims 5 and 12 are rejected under 35 U.S.C. 103(a) as obvious over Saran et al in view of Bashaw et al (1987, Chapter 3: Apomictic grasses, pp. 40-82, In: Principles of Cultivar Development, Vol. 2: Crop Species. MacMillan Publishing Co., NY).

Claims 5 and 12 are broadly drawn to a method with an unspecified number or type of plant identification, characterization, evaluation, and selection, and plant crossing breeding steps with any plant, without requiring a specific B_{III} hybridization step, and any plant made by said method.

Saran et al teach the starting materials and plant breeding method in *Dichanthium*, as discussed in the 35 U.S.C. 102(b) rejection discussed above.

Saran et al do not teach the combining by sexual crossing of more than two developed plant genotypes, to make new apomictic plants.

Bashaw et al teach for example on page 40, line 1, to page 41, line 30, that various grasses may be bred for the trait of apomixis, including species of *Dichanthium*, and that the availability of numerous ecotypes (e.g. biotypes), including those in the "*Dichanthium* complex" of species and related plant species may be used as good starting materials for a process of breeding for new apomictic plants.

Bashaw et al suggest on page 49, lines 24-38, that breeding for new facultative apomictic plants may require additional crossing of F1 hybrid plants, and may require the crossing with similarly identified and characterized facultative apomicts, to avoid problems that may be caused by inbreeding depression.

It would have been obvious to one of ordinary skill in the art to obtain the plant biotype/ecotype plants taught by Saran et al, the method of apomictic breeding with these biotype ecotype plants taught by Saran et al, and to modify the method of Saran et al as suggested by Bashaw et al, by obtaining other ecotype/biotype plants for the breeding process, and doing additional crosses with facultative apomictic F1 hybrid plants to make new facultative apomictic plants. The number of new ecotypes required to be obtained and the additional crossing with these newly obtained biotypes/ecotypes from the Delhi area, or some other locale, would be an obvious design choice for one of ordinary skill in the art.

No Claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Francis Moonan, whose telephone number is (703) 605-1201. The examiner can normally be reached on Monday through Friday 9:00 AM to 5:00 PM (E.S.T.)

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson, can be reached at (703) 306-3218. The fax phone number for this Group is (703) 308-4315. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0196.

Francis Moonan, Ph. D.
13 May 2002

DAVID T. FOX
PRIMARY EXAMINER
GROUP ~~180~~ 1638